ANCHOR DEVICE FOR SUPPORTING A POST

The present invention is related to an anchor device for supporting a replaceable elongate member such as a post in the ground. The post may be a guide post for traffic or be used for carrying a road sign.

It has been estimated that some 70 million guideposts, or delineators, are used on Australian roads.

Most of these guideposts are made of timber. Such timber guideposts require holes to be dug in the ground in order to install the guideposts correctly in position. A correct excavation of such holes and the subsequent correct positioning of the timber guideposts requires a great deal of skill and many man hours.

Furthermore, once such a timber guidepost is accidentally hit by a vehicle it is usually broken and rendered useless. Thereafter a stump of the broken guidepost has to be dug out, a new hole dug and a new guidepost arranged in this new hole in order to position a new guidepost correctly. This is a costly and time consuming exercise which requires a great deal of skill and experience.

Roll formed steel sections have also been introduced as guideposts. However once a steel section is hit by a vehicle, the guidepost is often rendered practically useless as the steel section can be severely twisted beyond repair and therefore needs to be totally replaced.

In one conventional arrangement a traffic guidepost has a tubular anchor having a closed lower end which is in the form of a flattened wedge which is driven into the ground by a suitable driver. The anchor has an open upper end into which is installed a tubular post which engages with the anchor in a telescopic manner. The post is retained in the anchor by appropriate fasteners. Usually the post had to be lubricated before installation in the anchor and slid downwardly in the anchor a considerable distance to make attachment between the anchor and the post more secure. One disadvantage of this conventional arrangement is that the post extends upwardly above the ground and is likely to be sheared off if impacted by a vehicle which means that the entire assembly of post and anchor will need

replacement.

In another conventional arrangement a steel anchor is used having a pointed end which is driven into the ground which supports an upwardly extending post which is riveted to a plate like top part of the anchor. Again the anchor extended above the ground and was likely to be damage by impact which therefore required total replacement.

Reference also may be made to replaceable guideposts or traffic posts which are disclosed in US Patent 6,461,084 which refers to a ground anchor having fins which are embedded in the ground and a post receiving portion in the form of deflectable collets that are clamped against a post by a clamping member. A damaged post can be replaced by removing the clamping member, replacing the post and reattaching the clamping member. However the ground anchor had an elongate part at an upper end thereof which extended above the ground and thus was liable to be impacted during a traffic collision which destroyed the ground anchor which thereby needed replacement.

Similar replaceable guideposts are described in GB 2,217,357, US 3,342,444, US 4,235,034, US 5,123,623, WO 96/23118, US 4,455,795, GB 2,346,854, DE 20211831, US 3,182,936, US 2,554,887, EP 0 004820 and WO 01/31145 all of which suffered from the same disadvantage as described above, i.e. having a ground anchor with a part extending above the ground for receiving a post which was liable to be impacted by a passing vehicle which therefore necessitated entire replacement of the ground anchor which was time consuming and expensive.

It is therefore an object of the invention to provide a ground anchor and a method of installation which therefore may alleviate the abovementioned disadvantage of the prior art.

The invention in one aspect provides a method of installation of a post in the ground which includes the steps of:

(i) forming a hole in the ground;

(ii) locating a ground anchor in the hole having one or more internal sockets wherein the or each internal socket is

substantially flush with ground level; and

(iii) inserting a post into the internal socket(s) whereby said post is retained therein with a major part of the post extending above ground level whereby flexing of the post upon impact may occur about a hinge point corresponding to ground level.

In step (i) the hole may be formed by an excavating tool such as a spade or use of a suitable driving tool or alternatively may be formed by hammering the ground anchor into the ground until the ground anchor is substantially flush with the ground. This is suitable when the ground is relatively soft.

It therefore will be appreciated from the foregoing that steps (i) and (ii) can be carried out sequentially or simultaneously.

In relation to step (iii) the post may be retained within the internal socket of the ground anchor by interference fit or alternatively by use of a latch or projection engaging an aperture in the ground anchor or the post. Preferably use is made of a latch of the post engaging a mating aperture of the ground anchor.

In another aspect of the invention there is provided a ground anchor having a body with one or more ground penetration members and at least one internal socket and retaining means for retaining a post within said at least one internal socket which is retaining means located adjacent said at least one internal socket whereby in use a post may extend into said at least one internal socket to engage the retaining means.

The internal socket of the body of the ground anchor may be elongate and thus may have a cross sectional shape in the form of a shallow rectangle wherein one pair of opposed surfaces of the rectangle have a much greater width than another pair of opposed surfaces of the rectangle. In another and more preferred arrangement the socket may be in the shape of a shallow channel corresponding to a V, U or C wherein the socket has a pair of opposed surfaces of shallow corresponding curvature which are of far greater width than another pair of opposed surfaces which are relatively narrow in width in comparison.

This embodiment is particularly useful because the posts to which the ground anchor of the invention are particularly directed have a corresponding shape to the internal socket and thus may be plate like having a pair of opposed broad surfaces and a pair of opposed edges which are restricted or narrow in width.

However it is within the scope of the invention as described in the preferred embodiment hereinafter that the body of the ground anchor comprise a pair of spikes separated by a spacer plate wherein each spike is provided with a socket or groove of channel configuration whereby edges or flanges of the post having a similar cross sectional shape may engage with and move or slide within a corresponding socket or groove.

The retaining means of the ground anchor may comprise a slot or aperture in a side wall of the body which in use may engage with a latch or projection of the post to retain the post within the internal socket of the ground anchor. Alternatively the retaining means may comprise a latch or projection of the body engaging with a corresponding slot or aperture of the post.

The body may also have at least one ground penetrating member or a pair of ground penetrating members. In one form the ground penetration member may comprise a sharpened bottom edge portion of the body preferably having a wedge type configuration. In another form the ground penetration member(s) may comprise one or more ground penetration spikes extending downwardly and outwardly from the body in use.

Reference may now be made to a preferred embodiment of the invention as shown in the attached drawings wherein:

FIG 1 is an exploded perspective view of the ground anchor of the invention in the appropriate orientation to engage with a mating post;

FIG 2 is a similar view to FIG 1 wherein the ground anchor is provided with a different retaining means to that shown in FIG 1;

FIG 3 shows a similar view to FIG 1 showing the use of a screwdriver or other tool to release the post from the ground anchor;

FIG 4 is a perspective view of a driving tool for forming a hole in the

ground before insertion of the ground anchor as shown in FIG 1;

FIG 5 is a perspective view of the ground anchor of FIG 1 associated with another driving tool for driving the ground anchor into the ground;

FIGS 6-7 show different perspective views of another ground anchor of the invention in the appropriate orientation to receive an associated post;

FIG 8 shows a perspective view of another form of ground anchor in accordance with the invention in the appropriate orientation to receive an associated post;

FIG 8A shows the device of FIG 8 being impacted by a mallet to penetrate the ground;

FIG 9 shows various forms of indicator means attached to the post which extends upwardly from the ground anchor as shown in FIG 1;

FIG 10 shows the post supported by a ground anchor of the invention springing back to an upright orientation after being impacted;

FIGS 11, 12 and 13 show views of the sequential steps of the method of the invention;

FIG 14 shows a post supported by a ground anchor of the invention having a ramp device associated therewith to lessen the force of an impact and showing the post springing back to the upright orientation after impact; and

FIGS 15-16 show a perspective view and a side view of the ground anchor of the invention having a peripheral rounded lip adjacent an open end of the internal socket; and

FIG 17 shows an exploded perspective view of another ground anchor device of the invention; and

FIG 18 shows a cross sectional view showing how a cover strip of the ground anchor is attached to the body of the ground anchor.

In FIG 1 there is shown ground anchor 10 of the invention having body 11 which has a pair of ground penetrating spikes 12. Each spike 12 is provided with reinforcement ribs 13. The body 11 is also provided with reinforcement ribs 14 and 15 on each side of an internal socket 16 having an open end 17. Ribs 14 and 15 also have pointed ends 14A and 15A. There is

also provided a post 18 of plate-like configuration having a latch projection 19 extending outwardly therefrom. The projection 19 engages with a mating aperture 20 in body 11 as shown in phantom.

In FIG 2 the ground anchor 10A of the invention is shown with a cover strip 21 and there is also provided a pair of teeth or projections 22 which extend inwardly into internal socket 16 as shown. These teeth 22 engage with elongate slot 23 of post 18A to facilitate retention of post 18A in internal socket 16. The cover strip 21 is slidably and releasably mounted to body 11 by engagement with securing slots (not shown) formed by securing ribs 24.

In FIG 3 there is shown how use of a screwdriver 25 or other suitable tool may effect separation of post 18A from ground anchor 10A wherein teeth 22 may be removed from engagement with slot 23. The screwdriver engages in aperture 26 adjacent teeth 25 to press on post 18A to release teeth 22 from engagement with slot 23 as shown by the arrow.

In FIG 4 there is shown a driving tool 27 for forming a cavity in the ground for subsequent insertion of ground anchor 10 or 10A into the ground. Driving tool 27 has a body 28 and a pair of ground penetration spikes 29 and an integral driving rod 30. Thus driving tool 27 can be hammered into the ground to provide the cavity which generally corresponds to the external cross sectional shape of body 11 whereby after removal of driving tool 27, ground anchor 10 or 10A may be inserted into the cavity. The driving tool 27 is preferably used in hard ground.

In another embodiment as shown in FIG 5 there is provided an alternative driving tool 31 having an insert part 32, shown in phantom, which fits within internal socket 16 of ground anchor 10. The driving tool 31 is also provided with an impact body 33 and impact surface 34 for impaction by a mallet or a hammer for driving ground anchor 10 into the ground. The driving tool 31 is also provided with an integral driving rod 35. The driving tool 31 may be used with a post thumper or a jackhammer to drive the ground anchor 10 into the ground. The provision of impact body 33 enables ground anchor 10 to be driven into the ground level with the surface thereof and also enables an even spread of the driving load applied to impact surface 33. The

insert part 32 ensures that the internal socket 17 is not damaged or misshaped during driving of ground anchor 10 into the ground.

In FIGS 6-7 there is shown a modified ground anchor 10B preferably made from metal having a body 11B and internal socket 16B. The post 18 is driven into internal socket 16B and retained therein by latch projection 19A engaging in aperture 20A as described above in relation to the FIG 1 embodiment. Socket 16B may be provided with a bottom wedge configuration shown at 36 to facilitate penetration of the ground. Body 11 is also provided with ground penetration spikes 12B and overlapping edges of opposed plates 37 and 38 forming internal socket 16B may be riveted together at 39.

In FIGS 8-8A there is provided an alternative ground anchor 10C having a pair of rod elements 40 which are spaced by a spacer plate or web 41. Each rod element 40 is provided with a pointed or sharp end 42 and also with internal sockets or grooves 43. Post 18C having flanges 44 and latch projections 45 may be brought into abutment with ground anchor 10C wherein flanges 44 engage with mating grooves 43. Each latch projection 45 may engage with a mating aperture (not shown) as described above in relation to the FIG 1 embodiment to retain post 18C within ground anchor 10C. There is also provided a length of wire 47 which may be used to release post 18C from ground anchor 10C when required. Alternatively a screwdriver may be used to release latch projections 45 from their mating apertures as shown in the FIG 3 embodiment.

Ground anchor 10C may be driven into the ground by use of a mallet 46 having handle 47 as shown in FIG 8A.

In FIG 9 there is shown indicator means in the form of a red reflector 48 attached to one face 49 of the post 18 and a white reflector 50 attached to another face 51 of the post 18.

In FIG 10 is illustrated one of the principal advantages of the ground anchor 10 of the invention wherein any flexing of the post 18 caused by impact with a vehicle will flex about a hinge point at ground level and then flex back automatically to its normal vertical position. This is shown in FIG 10

wherein post 18 after impact will flex about hinge point 52 to reach a position always lying on the ground as shown at 53 before flexing back to reach position 54 and finally to an upright position as shown at 55. This is clearly shown by the arrows 57. Position 55 of course corresponds to the position before impact which is shown by arrow 56.

In FIGS 11-13 there is shown schematic views of the method of the invention wherein ground anchor is embedded in the ground 58 substantially flush with a top surface 59. Subsequently post 18 is inserted in socket 17B of ground anchor 10 as shown by the arrow in FIG 12 and retained therein by the use of retaining means such as the use of latch projection 19 and mating aperture 20 as shown in FIG 1. FIG 12 shows post 18 about to be inserted in socket 17B and FIG 13 shows post 18 retained in ground anchor 10 with a major part of the post 18 extending above the ground. This facilitates flexing of post 18 as shown in FIG 10.

In FIG 14 there is shown post 18 retained in ground anchor 10 in the upright position shown in full outline prior to impact from vehicle wheel 60. Advantageously there may be provided a ramp 61 which causes wheel 60 to impact on the hinge point 52 whereby post 18 may flex as shown in phantom to reach positions 53, 54 and finally 55 as described in FIG 10. Ramp 61 may be retained in ground 58 by the use of spike 62. The various positions of wheel 60 are also shown in phantom.

In FIGS 15-16 there is also provided a rounded lip or peripheral rib 63 about open end 17 of internal socket 16. This feature is advantageous in that it inhibits post 18 from being indented by anchor 10 upon impact.

In FIGS 17-18 there is shown another embodiment of the invention wherein ground anchor 10A shown in FIG 2 is provided with a removable cover strip 21A having a pair of top latch projections 22 and a bottom rib 64. Initially cover strip 21A is hammered into position with rib 64 engaging in slot 65 which is provided between rib 66 and bottom rib 67 of body 11. Latch projections 22 then engage in aperture 68 below aperture 26 so that projections 22 may engage in slot 23 as shown in FIG 17. To remove post 18 the cover strip 21 is prised open at the top as shown in FIG 3. Each

projection 22 as shown in FIG 17 locks into post 18 as shown by the sloping angle of sides 69 of slot 23. FIG 17 also shows the engagement of rib 64 with mating ribs 66 and 67 of body 11.

In use the method of the invention as shown in the preferred embodiment in the drawings has considerable advantages over the prior art in that:

(i) upon impact damage to the post is alleviated by having the ground anchor terminating substantially at ground surface level which thereby provides a hinge point to enable flexing of the post and return to a normal upright position as shown in FIGS 10 and 12;

(ii) the post is securely retained in the ground anchor by the retaining means as shown by latch projection 19 or latch projections 22 engaging in corresponding apertures in the post whereby such retaining means is easily disengaged by a screwdriver or other suitable tool as shown in FIG 3; and

(iii) the internal socket of the ground anchor has a cross sectional shape which corresponds to the cross sectional profile of the post to facilitate secure engagement between the post and the ground anchor.

In another aspect of the invention there is provided a post ground anchor assembly which includes the ground anchor as described above together with the post as described above.